

**City of Lake Crystal  
Emerald Ash Borer Management Plan  
Adopted by City Council:**

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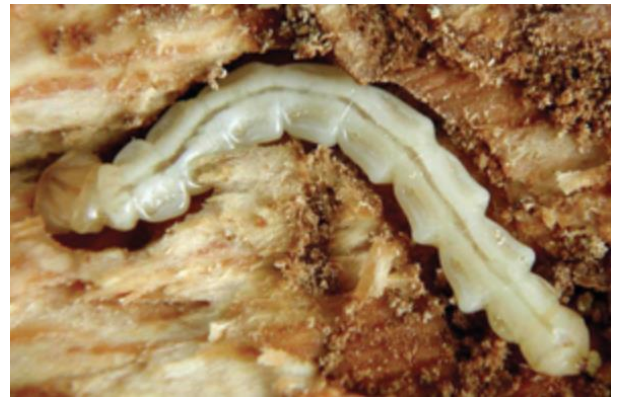
Angela Grafstrom, City Administrator

**Purpose**

The purpose of the City of Lake Crystal Emerald Ash Borer Management Plan is to lay out a plan of action to be taken in an effort to manage and reduce the economic, ecological and social impacts that this invasive pest poses on the community. With approximately 260 ash trees on public property, the estimated cost to treat, remove and replace these ash trees will total over \$300,000 during the next 10 to 15 years.

By utilizing an array of management strategies, the city can slow the spread of Emerald Ash Borer while also balancing the short and long-term effects on the community with the greater good in

## **Introduction & background**

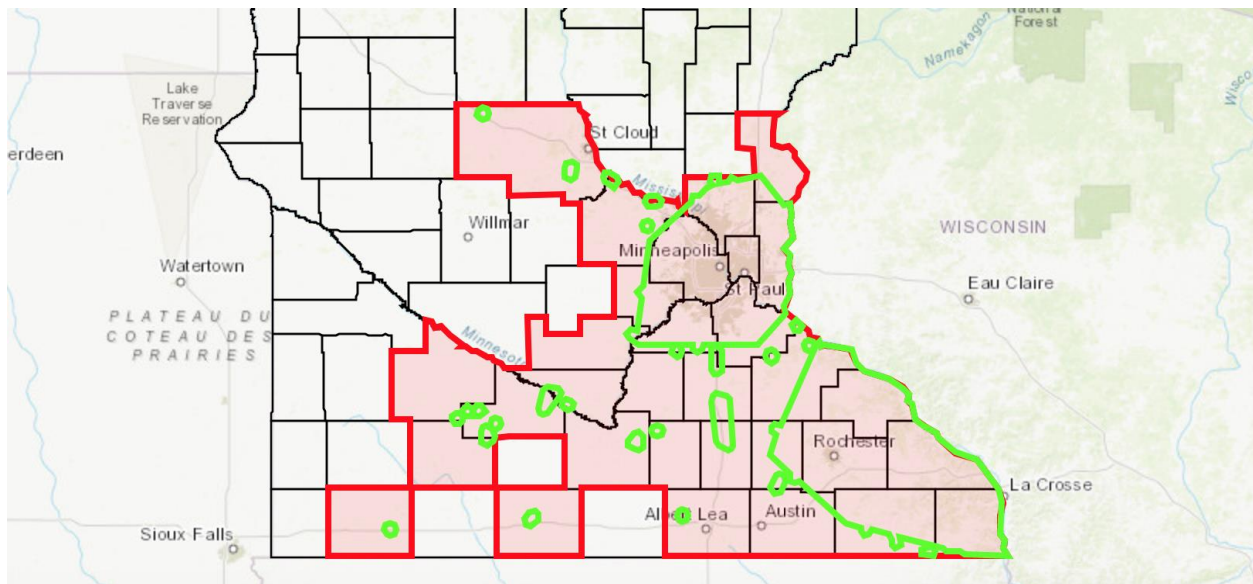


Emerald Ash Borer (EAB) is a non-native, invasive insect first discovered in Michigan in 2002. Although it wasn't discovered until 2002, it's believed that EAB was introduced into Michigan as early as 1990 via shipping materials. EAB can attack and kill all non-chemically treated true ash species (*Fraxinus*.)

EAB has been confirmed in 35 states and 5 Canadian provinces, with confirmed infestations in nearly every US state east of the Rocky Mountains. Estimated financial effects caused by EAB have been estimated to surpass \$10.7 billion nationwide, surpassing the financial burdens experienced from Dutch Elm Disease. Emerald Ash Borer (*Agilus planipennis*) adults seek out ash trees, where they lay their eggs in bark cracks and branch crevices in May-July. From there, the eggs hatch into larvae approximately 7-10 days later and begin boring into the tree by chewing through both the inner bark and the phloem layer. The phloem layer is a critical component of the tree's vascular system as key nutrients and sugars are transported to and from the leaves and roots there. Creating unique "S" shaped galleries through the phloem as they feed, the transportation of these nutrients is then cut off which causes both dieback and eventual death of the tree. These larvae will then overwinter in the same tree before going through the pupal stage in the following spring. From this point, adults chew distinct "D" shaped exit holes through the tree's bark from which they emerge in the spring. Once emerged, adults begin mating and laying their eggs in the coming weeks with the average female laying between 50-150 eggs in a month before dying. The primary means of dispersal for this insect is aided by human movement. The most common method of spread is through the movement of ash firewood or logs that are infested with the insect. For this reason, there are now special regulations in place governing how ash wood is to be handled and/or disposed of which is covered in greater detail in the wood utilization and disposal section of this document.

## **Current status in Minnesota**

In Minnesota, the first confirmed EAB infestation was found in St. Paul in 2009. From there the insect has spread outwards to include most of the Minneapolis/St. Paul metropolitan area. Because primary spread is done by human movement, confirmed infestations have jumped throughout the state with infestations in Duluth, Clearwater and Worthington to name a few as well as an established population in the southeastern portion of the state. There are now 30 counties in the state with EAB. The new detections were found near the city of New Ulm in Lafayette Township and in the city of Sanborn. The closest confirmed EAB infestation is in St. Clair, MN; around 20 miles east of Lake Crystal.



Current status of EAB infestation (MDA interactive EAB website)

Having a detailed plan in place prior to EAB being confirmed in Lake Crystal is important. The insect's population is known to start small, then grow rapidly in the following years until peaking 8-10 years later. For this reason, most communities have struggled to confirm EAB in their landscapes until the insect has reached year three of its infestation, by this point it becomes quite difficult to keep up with management as the insect continues to kill new trees. With a well thought out and detailed plan in place prior to confirming EAB in Lake Crystal, the city will be able to get an early start on management practices, lessening the overall numbers of ash in the community and thus lessening the economic, ecological and social effects the community will experience.

Communities in Minnesota benefit from having close to 20 years of EAB management in other communities to reference when considering their management strategies. For this reason, the spread of EAB throughout the state and more specifically, throughout communities once an infestation has been confirmed has been much slower than anticipated. This is because most EAB prediction models and statistics are based on earlier infestations in communities unprepared for the arrival of

EAB. By having time before the insect arrives, the city is fortunate to be able to take these steps and develop a plan before the trees are infested.

## **Lake Crystal public/private tree inventory**

As of 2022, the city of Lake Crystal completed its inventory on all city managed ash trees, these are trees located in right-of-ways (referred to as boulevard trees) as well as trees located in city parks and on city owned properties. Since completion, this inventory will be continually updated to reflect new tree plantings and tree removals. A summary of the current public tree inventory shows that of the city's current population of trees approximately 30% of them are ash trees. While accurate, detailed information is available on public trees, no such similar inventory on the private trees in Lake Crystal, including those trees in our natural wooded areas.

After the outbreak of Dutch Elm Disease in the 1970's and 1980's, ash trees were one of the most common species planted to replace elm because of how readily available they were and how easily they grew. It is likely that there are many ash trees on properties built in that era. Learning from past mistakes as well as insect and disease outbreaks like Dutch Elm Disease and Emerald Ash Borer, species diversity is now one of the biggest objectives when it comes to managing an urban tree canopy.

**DNR 2010 Community Tree Survey for the City of Lake Crystal, Blue Earth County**

\*\* Only maintained areas are surveyed. Maintained areas are periodically mowed or fall within an artificial surface, (e.g. parking lot).

**Table 1. Diversity of tree genera, size class distribution, and healthy tree population and percents.**

Genera	Dead trees are included in population numbers & all percents.						Only live trees are included in numbers & percents.		
	Population	Genera %	Size Classes ++				Population	All Classes	
			Small	Medium	Large	Super		Genera %	Healthy
Fraxinus (Ash)	1,800	30.5%	4.1%	19.7%	56.6%	19.7%	1,800	30.5%	67.2%
Acer (Maple)	1,300	21.0%	27.4%	23.8%	35.7%	13.1%	1,300	21.0%	85.7%
Picea (Spruce)	700	12.0%	31.3%	43.8%	22.9%	2.1%	700	12.0%	100.0%
Quercus (Oak)	500	9.0%	5.6%	2.8%	36.1%	55.6%	500	9.0%	69.4%
Juglans (Black Walnut)	300	5.8%	21.7%	4.3%	30.4%	43.5%	300	5.8%	95.7%
Malus (Apple)	300	4.8%	68.4%	31.6%	0.0%	0.0%	300	4.8%	94.7%
Populus (Poplar)	200	2.8%	27.3%	27.3%	36.4%	9.1%	200	2.8%	81.8%
Betula (Birch)	100	2.3%	77.8%	22.2%	0.0%	0.0%	100	2.3%	88.9%
Celtis (Hackberry)	100	1.8%	14.3%	14.3%	57.1%	14.3%	100	1.8%	100.0%
Gleditsia (Honeylocust)	100	1.8%	0.0%	0.0%	71.4%	28.6%	100	1.8%	100.0%
Tilia (Basswood)	100	1.8%	14.3%	14.3%	42.9%	28.6%	100	1.8%	100.0%
Thuja (White Cedar)	<100	1.3%	80.0%	0.0%	20.0%	0.0%	<100	1.3%	100.0%
Boxelder	<100	1.0%	50.0%	0.0%	0.0%	50.0%	<100	1.0%	50.0%
Morus (Mulberry)	<100	1.0%	75.0%	25.0%	0.0%	0.0%	<100	1.0%	100.0%
Pinus (Pine)	<100	0.8%	66.7%	33.3%	0.0%	0.0%	<100	0.8%	100.0%
Robinia (Black Locust)	<100	0.8%	33.3%	33.3%	33.3%	0.0%	<100	0.8%	100.0%
Prunus (Plum)	<100	0.5%	100.0%	0.0%	0.0%	0.0%	<100	0.5%	100.0%
Pseudotsuga (Douglas Fir)	<100	0.5%	0.0%	0.0%	50.0%	50.0%	<100	0.5%	100.0%
Abies (Fir)	<100	0.3%	0.0%	100.0%	0.0%	0.0%	<100	0.3%	0.0%
Larix (Tamarack)	<100	0.3%	0.0%	0.0%	100.0%	0.0%	<100	0.3%	100.0%
Salix (Willow)	<100	0.3%	100.0%	0.0%	0.0%	0.0%	<100	0.3%	0.0%
Sorbus (Mountain Ash)	<100	0.3%	0.0%	100.0%	0.0%	0.0%	<100	0.3%	0.0%

**Table 2. Tree condition by size class.**

Size Classes ++	Population	Size Class %	Healthy	Dieback	Discolor	Both	Dead
Small (1" - 4.9")	1,400	22.5%	93.3%	5.6%	1.1%	0.0%	0.0%
Medium (5" - 11.9")	1,300	21.3%	87.1%	12.9%	0.0%	0.0%	0.0%
Large (12" - 20.9")	2,300	37.5%	80.7%	19.3%	0.0%	0.0%	0.0%
Super (21" +)	1,100	18.8%	64.0%	36.0%	0.0%	0.0%	0.0%

The numbers above (both tables) do not include shrub-like trees (e.g. Arbovitae) or non-maintained areas such as vacant areas.

\*\*Area within city limits is 945 acres. The Business & Residential area is 457 acres, of which 100.0% (457 acres) is considered Maintained while 0.0% (<1 acres) is considered Non-Maintained.

## Public tree management plan

The city of Lake Crystal will utilize a combination of strategies to manage its population of public ash trees with an overall objective of treating some shade trees and replacing the remaining trees. This will include:

- Preemptive removal of poor conditioned and/or poorly placed ash trees prior to them being infested with EAB.
- Removal of any ash infested with EAB and replacement with a tree suitable for the location

- Chemical treatment of approximately 50 trees per year / 15% of the ash population to preserve these trees while new shade trees can be established. These trees will be treated on a cyclical basis as recommended by industry standards— every 2 years.

## **Strategic Removals/Replacements**

Preemptively removing poor conditioned and/or poorly placed ash trees is one of the best ways to get ahead of looming EAB infestation. Trees to be preemptively removed are those trees that have poor structure, significant dieback, basal wounds, overhead utility wires or other characteristics which would prevent them from being candidates for chemical treatment. It is proposed that a minimum of 10 ash trees are preemptively removed annually beginning in 2022 to begin lessening the overall ash population. From that point on, an additional 10-15 trees will be selected annually to be removed and replaced in the following year. By removing trees prior to infestation of EAB, a substantial amount of money may be saved as infested trees cost 2-3x more to remove. This dramatic increase in costs is associated with the elevated risk the tree poses to arborists, specialized equipment becomes necessary to remove the tree and extensive cleanup work is necessary as the tree becomes extremely brittle when the wood has dried out.

## **Chemical Treatments**

Since EAB was found in the US in 2002, many advancements have been made in the treatments available to protect ash trees from an infestation. Today, the industry standard and most reputable treatment available is a basal injection of emamectin benzoate performed every two years. The city of Lake Crystal will treat trees rated 1 & 2 (best rating) in the inventory, totalling 100 trees. Trees must be treated every other year indefinitely.

## **Replanting**

Ash trees make up approximately 30% of Lake Crystal's public trees and are the most common public tree within the city. Realizing that we are in jeopardy of losing all of the ash trees in Lake Crystal, it is the city of Lake Crystal's goal through this Emerald Ash Borer Management Plan to maintain a replacement ratio of 1:1 on all public ash trees removed in the city. During replanting efforts, special attention will be given to ensure the right tree is planted in the right place. During utility conflicts, proximity to other trees and proximity to other infrastructure (roads, driveways, street lights, etc.)

determine if a replacement tree will be planted on site or not. If it's determined the site is not suitable for a replacement tree, a tree will be planted in the next closest open planting space. It has been suggested that communities follow a 30-20-10 rule for structuring their urban forest composition. The rule states that no more than 30% of the composition be made up for trees in one family, no more than 20% of the same genus, and 10% of the same species to ensure a diverse tree canopy which helps prevent future problems with disease and pests.

## **Private tree management**

Removal and treatment of ash trees on private property is the responsibility of homeowners. Recommendations for tree care specialists are available for residents. The City will proactively communicate about EAB through the website, newsletter, and social media. Beyond information sharing, the City will proactively connect with businesses, the school district, and residents to ensure best management practices become more well known. In addition, the City will give presentations to smaller groups regarding EAB best management practices. When an active EAB infestation occurs in Lake Crystal; the City may apply for an Americorps/Greencorps member, if necessary, to assist with EAB outreach and implementing plan efforts.

Educating the public aggressively must be a priority to manage expectations and so that citizens can self-help during the peak years to handle infested ash trees appropriately before they become public safety hazards. The Minnesota Department of Agriculture (MDA) and Natural Resources (DNR) have community outreach in place to discourage the movement of firewood throughout the state, including brochures, billboards, advertisements, and vehicle inspections. In addition, a statute restricts the movement of unapproved firewood onto DNR owned land and a state and federal quarantine restrict movement of firewood of any hardwood tree species into a non-quarantined county.

1. Through educational efforts, property owners will be encouraged to diligently monitor their ash trees for any signs of EAB. They can either contact the City or the MDA Arrest the Pest hotline for more information.
2. The City encourages private property owners to consider treatment of individual ash trees.

Treatments are offered locally by the following companies, in no particular order:

- Tree and Turf Home Care – (507) 920-8123, Mankato
- Carr's Tree Service – (888) 470-3355, Courtland
- Lawn Pro – (507) 869-3847, Mapleton/Pemberton

3. The City will also continue to encourage property owners to replace lost trees with species appropriate for the site or even in advance of potential infestation and ash removal. As with public lands, the City encourages property owners to diversify the species on their property to buffer against future insect/disease outbreaks. A valuable reference that is available to homeowners for planting suggestions is available online through the U of M's extension office: <https://extension.umn.edu/tree-selection-and-care/recommended-trees-minnesota#recommended-trees-for-southwest-minnesota-1275811>

## Wood utilization & disposal

Blue Earth County is currently under a quarantine put in place by the Minnesota Department of Agriculture (MDA) to regulate the movement of firewood throughout the county. This quarantine regulates how infested and non-infested ash wood is disposed of and where it may be transported to. Currently, the regulations in place by the MDA on quarantined counties within Minnesota are as follows:

- Ash wood material may be disposed of at an MDA approved drop off location, an updated list of these locations may be found at: <https://www.mda.state.mn.us/plants-insects/ash-tree-waste-disposal-sites>
- Chipping of wood material into wood chips with at least two-dimensions of one inch or less.
- Debarking of logs by removing at least 1" of the outer bark/wood.
- Burning the wood

## Costs

- Treatment Cost: Injector Equipment: \$2,000 (one time cost). Treatment chemicals can be ordered from Rainbow Tree Care, adequate chemical to treat 50 trees per year is approximately \$2,000. Treatments will be performed by city staff.
- Replacement Cost: \$200/tree x 260/ash trees = \$52,000 for ash tree replacements. Plus Parks Department labor for planting and tending to trees. Care would involve watering (weekly at minimum), pruning and mulching plants while they're young.



- Removal Cost: \$1,000+/tree removal and stump grinding. \$1,000 x 260/ash trees= \$260,000. Costs could rise as trees die, they become brittle and more dangerous to remove. Lake Crystal Parks/Streets Department will dispose of ash lumber, utilizing it for firewood and mulch as much as possible. All other wood and debris (twigs and leaves) must be properly disposed of at

- Parks department labor costs.

### **Financial Assistance:**

Currently, there are no grants or public funding available to remove and replace or treat ash trees on private property.

Grants funding is available for removal and replacement of ash trees on public property:

<https://www.dnr.state.mn.us/grants/forestmgmt/protect-community-forests.html>

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## **Tree Replacement Plan**

### **Context:**

It's important to remember that all ash trees will become infested with EAB and die. At present, there is no way to stop the spread of EAB, so the issue becomes not if an ash tree will die but when. The City of Lake Crystal has chosen a plan to prioritize removal and replacement while treating some ash trees as other shade trees are established.

### **Treating Trees:**

To protect against EAB, trees must be treated every other year. Each year the Parks Department must alternate between trees selected for treatment using emamectin benzoate and injector equipment.

The tree inventory map can be utilized to track which trees have been treated each year.

Link to tree inventory map:

<https://www.google.com/maps/d/u/0/edit?mid=1sRQKDiw-dQhy4Q0wiuO1VGXqY4JLd6zi&ll=44.15959661349336%2C-93.88635295796686&z=15>

Tree inventory spreadsheet:

<https://docs.google.com/spreadsheets/d/1IcHtFWoWILRPLUrzARXXB3NtFsR2qET2/edit#gid=336988801>

### **Tree Removal:**

There are approximately 260 ash trees on public property that will need to be eventually removed and replaced. It is recommended that the city aim to remove at least 10% of the poor/fair condition trees each winter to prevent an unmanageable die off and clean up in the future. Treating 100 good condition ash trees will help to make the removal process more manageable.

Late winter/ early spring is the best time to remove trees as EAB will not have the ability to emerge in the spring when wood has been properly processed. It also helps prevent the spread of other pests and diseases. Ash trees should not be removed during EAB's active season, from May to October.

### **Tree Replacement:**

DNR grants funding available for EAB management requires that trees removed due to EAB are replaced. To prevent future canopy loss due to pests and diseases, it is recommended that cities prioritize planting a diverse range of species.

Approximate percentages of the current Lake Crystal tree canopy: 31% ash, 28% crabapple, 12% maple, 10% hawthorn, with lower percentages of other species.

### **Recommended Species for Replanting after Ash Removal:**

Small Trees:

Cherry, Amur Choke (*Prunus maackii*), \*Crabapple (*Malus* spp.), \*Hawthorne, thornless (*Crataegus crus-galli*), Maackia, Amur (*Maackia amurensis*), Magnolia, star (*Magnolia stellata*), Plum 'Princess Kay' (*Prunus nigra*), Redbud, eastern (*Cercis canadensis*), Serviceberry 'Autumn Brilliance' (*Amelanchier x grandiflora*),

Medium Trees:

\*Alder (*Alnus* spp.), \*Cherry, Black (*Prunus serotina*), Ginkgo- Seedless Selections (*Ginkgo biloba*), \*Hop hornbeam/Ironwood (*Ostrya virginiana*), \*Hornbeam, American (*Carpinus caroliniana*), Horsechestnut (*Aesculus glabra*), Magnolia (*Magnolia acuminata*), Mountain ash- European (*Sorbus aucuparia*), Mountain ash- Korean (*Sorbus alnifolia*), Buckeye- Ohio (*Aesculus glabra*), Yellowwood- American (*Cladrastis kentukea*).

### Large Trees:

\*Birch- River (*Betula nigra*), Catalpa- Northern (*Catalpa speciosa*), \*Coffee tree, Kentucky - Seedless Selection Only (*Gymnocladus dioica*), Filbert- Turkish (*Corylus colurna*), \*Hackberry (*Celtis occidentalis*), \*Hickory, shagbark (*Carya ovata*), \*Hickory- bitternut (*Carya cordiformis*), \*Honeylocust, Thornless - Seedless Selection Only (*Gleditsia triacanthos* var. *inermis*), Horsechestnut (*Aesculus hippocastanum*), Linden, American (*Tilia americana*), \*Maple- black (*Acer saccharum* subsp. *Nigrum*), \*Maple- red (*Acer rubrum*), \*Maple- sugar (*Acer saccharum*), \*Oak, black (*Quercus velutina*), \*Oak- bur (*Quercus macrocarpa*), Oak- chinkapin (*Quercus muehlenbergii*), Oak- English (*Quercus robur*), Oak- Heritage (*Quercus x macdanielli*), \*Oak- Northern Pin (*Quercus ellipsoidalis*), \*Oak- red (*Quercus rubra*), \*Oak- swamp white (*Quercus bicolor*), \*Oak- white (*Quercus alba*).

\*Denotes native to Minnesota.

### Recommended native trees for the region:

<https://extension.umn.edu/tree-selection-and-care/recommended-trees-minnesota#recommended-trees-for-southwest-minnesota-1275811>

### Calendar Plans:

Best Management Practice recommends that no work be completed on ash trees during the EAB Active Period: May 2 – September 30. This helps reduce the risk of EAB spreading during transportation, and will provide habitat for EAB adults to lay eggs that will be destroyed during the dormant period. Note that trees damaged in storms or hazardous trees can be removed at any time to prevent damage to property or persons.

If possible, perform maintenance on or remove ash trees during the EAB Dormant Period: October 1 – May 1.

For more information on EAB BMPs visit [www.mda.state.mn.us/eab](http://www.mda.state.mn.us/eab)

November & December: Tree pruning. Winter is the best time to prune because it reduces risk of pests and spread of disease in all species.

November, December, January, February & March: Remove and process ash trees in poor condition. Aim for 10+ trees per winter. Use the inventory map to track where trees were removed. Keep vigilant for signs of EAB infestation. Winter is the best time to detect new EAB infestations when trees do not have leaves.

February, March, & April: Order trees for spring planting, plan tree planting events.

May & June: Tree planting, mulching, watering. Use the map to track where new trees were planted and for a watering schedule, if necessary. Treat ash trees.

July & August: Mulch and water, order trees for fall planting.

August, September & October: Fall tree planting.

**Sources:**

Hafner, J., Orange, J. *Emerald Ash Borer Management Plan*. Minnesota Shade Tree Advisory Committee.

[http://www.mnstac.org/uploads/2/0/9/3/20933948/model\\_eab\\_management\\_plan\\_updated.pdf](http://www.mnstac.org/uploads/2/0/9/3/20933948/model_eab_management_plan_updated.pdf)